

What is claimed is:

1. A composition comprising the result of combining:
- (a) a starch component having polymer reactive carbonyl functionality; and
- (b) a polymer component having carbonyl reactive functionality.
2. A composition according to claim 1 wherein:
- (a) the starch component and polymer component are reacted to form an adducted combination.
3. A composition according to claim 1 wherein:
- (a) the polymer component includes reactive groups selected from primary amine groups, secondary amine groups, and mixtures thereof.
4. A composition according to claim 1 wherein:
- (a) the polymer component comprises polyvinylamine.
5. A composition according to claim 1 wherein:
- (a) the starch component has a reactive carbonyl functionality of at least 5 microequivalents per gram.
6. A composition according to claim 1 wherein:
- (a) the starch component has a reactive carbonyl functionality of at least 10 microequivalents per gram.
7. A composition according to claim 1 wherein:
- (a) the starch component has a reactive carbonyl functionality of no more than 300 microequivalents per gram.

8. A composition according to claim 1 wherein:
(a) the starch component comprises an oxidized starch.

9. A composition according to claim 8 wherein:
5 (a) the starch component comprises a starch oxidized with oxidizing agent selected from periodate(s); hypochlorite(s); ozone; peroxide(s); hydroperoxide(s); hydrogen peroxide; persulfate(s); percarbonate(s); and, mixtures thereof.

10 10. A composition according to claim 8 wherein:
(a) the starch component comprises a starch oxidized with oxidizing agent selected from sodium periodate; potassium periodate; sodium hypochlorite; calcium hypochlorite and mixtures thereof.

15 11. A composition according to claim 10 wherein:
(a) the starch component comprises oxidized starch resulting from oxidizing with 0.01% to 5% oxidizing agent, by wt. of starch.

12. A composition according to claim 11 wherein:
20 (a) the starch component comprises oxidized starch resulting from oxidizing with 0.3% to 3.0% oxidizing agent, by wt. of starch.

13. A composition according to claim 12 wherein:
(a) the oxidizing agent is periodate oxidizing agent.

25 14. A composition according to claim 10 wherein:
(a) the starch component comprises starch oxidized with hypochlorite oxidizing agent.

15. A composition according to claim 14 wherein:

- (a) the starch component comprises a starch oxidized with hypochlorite oxidizing agent at a level of 0.005% to 3.0% available chlorine, by wt., based on wt. of starch.

16. A composition according to claim 15 wherein:

- (a) the starch component comprises a starch oxidized with hypochlorite oxidizing agent at a level of 0.15 to 1.5% available chlorine, by wt., based on wt. of starch.

17. A composition according to claim 1 wherein:

- (a) the starch component has a ratio of reactive carbonyl functionality to carboxyl functionality of at least 1:1.

18. A composition according to claim 17 wherein:

- (a) the starch component has a ratio of reactive carbonyl functionality to carboxyl functionality of at least 2.5:1.

19. A composition according to claim 1 wherein:

- (a) the polymer component is provided in an amount of 0.1%-5.0% by wt., based on wt. of starch component.

20. A composition according to claim 19 wherein:

- (a) the polymer component is provided in an amount of 0.5%-2.5% by wt., based on wt. of starch component.

21. A paper product including:

- (a) at least 2%, by wt., of a composition according to claim 1.

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22. A method of making paper comprising:
- (a) providing in a wet end process, a composition in accord with claim 1 at a level of at least 2%, based on dry wt. of paper.
23. A method according to claim 22 comprising:
- (a) providing in the wet end process, a composition in accord with claim 1 at a level of at least 4%, based on dry wt. of paper.
- 10 24. A method according to claim 23 wherein:
- (a) the paper is made without use of a size press step.
25. A paper product made in accord with claim 22.

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